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## HTLV-I in Northeast Brazil: Differences for Male and Female Injecting Drug Users

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### Abstract

**Background:** To investigate the seroprevalence of HTLV-I infection among male and female injecting drug users (IDUs).

**Methods:** A cross-sectional study conducted in Salvador, Brazil, from 1994 to 1996 (Projeto Brasil-Salvador). The study population of 216 asymptomatic IDUs was selected using snowball contact technique. Data on demographics, sexual behavior, and drug use practices were obtained and blood samples collected for serologic assays. Sera were screened for HIV-1/2 and HTLV-I and HTLV-II antibodies by enzymelinked immunosorbent assay (ELISA) and confirmed by Western blot.

**Results:** The overall prevalence of HTLV-I/II was 35.2% (76 of 216). The seroprevalence of HTLV-I, HTLV-II, and HIV-1 was for males 22.0%, 11.3%, and 44.1%, and for females 46.2%, 10.3%, and 74.4%, respectively. Specific seroprevalence of HTLV-I infection demonstrated linear trend with increasing age and increasing duration of drug use. Using univariate analysis, the variables that were significantly associated with HTLV-I infection among males included needle sharing practices, duration of IDU, HIV-1 seropositivity, and positive test result for syphilis. Among women, duration of injecting drug use and positive test result for syphilis were strongly associated with HTLV-I infection.

**Conclusions:** Retrovirus infection is highly prevalent among IDUs in Salvador, Brazil and HTLV-I is more common than HTLV-II. Duration of drug use is an important correlate of

## HTLV-I infection.

HTLV-I and HTLV-II were first recognized among injection drug users (IDUs) in 1984 [\(1\)](#). Reported seroprevalence rates of HTLV-I/II among this group range from as low as 0.4% to 53% in the United States and Europe. However, differences in study design, and in the testing algorithms to define infection make these rates difficult to compare [\(2-5\)](#). Furthermore, in the United States and Europe, HTLV-II accounts for most HTLV infections among IDUs [\(6\)](#).

HTLV-I infection and its related pathologies are being recognized in many regions of Brazil [\(7-9\)](#). Results from investigations with samples from blood banks found rates from 0.08% in northern and southern regions up to 1.35% in Salvador, a city located in the north [\(10\)](#). Other studies conducted in Brazil demonstrated the presence of these infections among selected groups [\(7-14\)](#). In this paper, we report results of the seroprevalence of HTLV-I infection among male and female IDUs in Salvador, Brazil according to selected factors.

## METHODS

### Subject Selection

The study population was described elsewhere [\(15\)](#). Briefly, a cross-sectional study was conducted in the colonial district of Salvador between August 1994 and September 1996 (Projeto Brasil-Salvador). Salvador, the capital of the state of Bahia, is a city with approximately 2.5 million inhabitants. Its population is roughly 80% black or racially mixed. The colonial district, known as Pelourinho, is located in the historical center of Salvador and is surrounded by areas of marginality, prostitution, drug use, and drug traffic. The study group was identified from among individuals who reside or frequent the historic district using snowball sampling technique [\(16\)](#). Eligibility criteria for the study participation included reported drug injection in the last 6 months, age 15 or older, and signed informed consent. None of them was in drug treatment. Data on demographics, sexual behavior, attitudes, and drug use practices were obtained and 10 ml samples of blood were collected for serologic assays.

### Laboratory Methods

Sera were screened for HIV-1/2 and HTLV-I/II antibodies by ELISA (Abbott HIV-1/2, third-generation Plus EIA, Delkenheim, Germany; HTLV-1 rp21e-enhanced EIA, Cambridge Biotech Corp., Worcester, MA, U.S.A.; and HTLV Blot 2.4, Genelabs Diagnostics, Science Park Drive, Singapore, respectively). The GLD HTLV Blot 2.4 also discriminates between HTLV-I and HTLV-II infections. Evidence for the presence of *Treponema pallidum* infection was initially evaluated by serum reactivity to nontreponemal cardiolipin antigen (VDRL, Behring, Marburg, Germany). VDRL-positive samples were further tested by *T pallidum* indirect immunofluorescence (FTA, Behring).

## RESULTS

Of the 216 selected IDUs, 177 (81.9%) were men and 39 (18.1%) were women. Most (97.7%) reported injecting cocaine and 2.3% referred to injecting a mixture of cocaine and heroin during the past 6 months. The overall prevalence of HTLV-I/II was 35.2% (76 of 216). The unadjusted

seroprevalence rates of HTLV-I, HTLV-II, and HIV-1 for men were 22.0%, 11.3%, and 44.1%, respectively; for women, 46.2%, 10.3%, and 74.4%, respectively. HTLV-I was identified in 72.4% of HTLV-positive IDUs. The seroprevalence of coinfection among this group was reported elsewhere (15). The mean age at enrollment was 24.6 years (standard deviation [SD]  $\pm$  7.9) and 27.4 years (SD  $\pm$  8.2) and the mean age at first injecting drug use was 16.6 years (SD  $\pm$  4.6) and 16.4 years (SD  $\pm$  4.7) for males and females, respectively. The median duration of injecting drug use in years was 6 years for men and 8 years for women. Among men and women, most IDUs had between 1 to 8 years of education (mostly between 1 to 2 years), and an illegal source of income (robbery and drug traffic). Regarding drug injection behavior, more than half of the men reported drug use within the last week, 68% of men reported 4 to 20 instances of drug use on a typical day. About 74% of men reported reuse of needles/syringes up to 10 times in a typical month, close to 80% reported needle-sharing practices. Regarding sexual behavior among men, the median number of current sexual partners was 2. In the sampling, 66% reported vaginal sex and 37.5% anal sex with a woman more than one time in the previous month. Condom use was very limited among males, with most (73%) reporting never having used a condom in sexual encounters. Of them, 21% had contracted syphilis. With respect to drug use among women, fewer than half reported drug use in the previous week, most reported 4 to 20 instances of drug use on a typical day (64%), reuse of needles/syringes up to 10 times (76.9%) on a typical month, and needle-sharing practices (69.6%). Concerning sexual behavior, the median number of current sexual partners was 1 (interquartile range, 1-4), 79.5% reported vaginal sex and 10.3% anal sex more than once within the last month. Condoms were almost never used among females: 82% reported having never used a condom in sexual encounters. More than half the women had had syphilis (56.8%).

[Table 1](#) presents the seroprevalence of HTLV-I infection according to selected variables. In terms of age specific seroprevalence of HTLV-I, no women between 15 to 20 years old ( $n = 11$ ) were infected. However, in the age groups from 21 to 34 years ( $n = 19$ ) and 35 to 66 years ( $n = 9$ ), women maintained a higher rate of HTLV-I infection (52.6% and 88.9%, respectively) than men. Among men, the seroprevalence rate increased from 13% for 15- to 20-year-old persons ( $n = 69$ ) to 24.1% and 40% for the 21- to 34-year-old ( $n = 88$ ) and 35- to 66-year-old ( $n = 20$ ) age groups. This linear trend was statistically significant for men ( $\chi^2$  trend,  $p = .007$ ) and women ( $\chi^2$ ,  $p = .00012$ ). Seroprevalence of HTLV-I was higher for those whose first drug use was in the earlier years (1958-1979) for both men (43.5%) and women (81.8%) and lower in more recent years (1990-1996) for men (13.5%) and women (8.3%). According to drug use behavior, variables such as drug use within the last week, number of times of reuse of needles/syringes on a typical month, and needle sharing, the seroprevalence of HTLV-I was higher in the category of greater risk of infection for both men and women. However, the  $p$  values were not statistically significant except for needle sharing among men ( $p = .02$ ). The seroprevalence of HTLV-I was much higher among HIV-positive men (39.7%;  $p = .001$ ) than HIV-negative respondents (8.1%). It was also higher among HIV-positive women (51.7%) but the  $p$  value was not statistically significant. HTLV-I was more prevalent among men (47.2%) and women (57.1%) with syphilis. The number of current sexual partners was not associated with HTLV-I infection neither for men nor for women. The factor of men reporting sex with other men ever in their lifetimes (72 of 105) was also not found to be associated with HTLV-I infection.

Characteristic	Male (n=100)		Female (n=100)	
	n (%)	95% CI	n (%)	95% CI
HTLV-I seroprevalence	22 (22.0)	15.5-28.5	46.2 (46.2)	39.7-52.7
HIV seroprevalence	44.1 (44.1)	37.6-50.6	74.4 (74.4)	67.9-80.9
HTLV-II seroprevalence	11 (11.0)	5.5-16.5	11 (11.0)	5.5-16.5
HTLV-I/II seroprevalence	33 (33.0)	26.5-39.5	57.2 (57.2)	50.7-63.7
HTLV-I/II seroprevalence (HTLV-I only)	22 (22.0)	15.5-28.5	46.2 (46.2)	39.7-52.7
HTLV-I/II seroprevalence (HTLV-II only)	11 (11.0)	5.5-16.5	11 (11.0)	5.5-16.5
HTLV-I/II seroprevalence (HTLV-I and II)	11 (11.0)	5.5-16.5	11 (11.0)	5.5-16.5
HTLV-I/II seroprevalence (HTLV-I or II)	33 (33.0)	26.5-39.5	57.2 (57.2)	50.7-63.7
HTLV-I/II seroprevalence (HTLV-I and II or HTLV-I or II)	44 (44.0)	37.5-50.5	57.2 (57.2)	50.7-63.7
HTLV-I/II seroprevalence (HTLV-I and II or HTLV-I or II or HTLV-I and II)	55 (55.0)	48.5-61.5	68.2 (68.2)	61.7-74.7
HTLV-I/II seroprevalence (HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II)	66 (66.0)	59.5-72.5	79.2 (79.2)	72.7-85.7
HTLV-I/II seroprevalence (HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II)	77 (77.0)	70.5-83.5	90.2 (90.2)	83.7-96.7
HTLV-I/II seroprevalence (HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II)	88 (88.0)	81.5-94.5	99.2 (99.2)	92.7-105.7
HTLV-I/II seroprevalence (HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II or HTLV-I and II or HTLV-I or II)	99 (99.0)	92.5-105.5	100 (100.0)	93.5-106.5

Table 1

Specific seroprevalence of HTLV-I infection according to years of injecting drug use demonstrated a significant linear trend with increasing duration among both men ( $\chi^2$  trend,  $p = .0007$ ) and women ( $\chi^2$  trend,  $p = .004$ ).

## DISCUSSION

In the present report, a high seroprevalence of HTLV-I and HIV infection was detected among both men (22% and 44.1%, respectively) and women, (46.2% and 74.4%, respectively) suggesting that retrovirus infection is efficient among IDUs in Salvador, as well as in other regions of Brazil (13,15). However, our results showed higher prevalence of HTLV-I than HTLV-II as compared with the city of Santos, São Paulo where not only the seroprevalence of HTLV infection (11%) was lower and no difference in the percentage of HTLV-I or HTLV-II was found (13). In addition, our data demonstrated a higher prevalence of HTLV-I than HTLV-II among IDUs. This finding differs from that observed in the United States and Europe, where HTLV-II represents the majority of HTLV infections among this group. This fact probably reflects the high endemicity of HTLV-I in this area of Brazil.

Age-specific seroprevalence of HTLV-I infection presented here confirmed other findings of a linear increase of seroprevalence with increasing age. This association probably reflects the accumulation of exposure to HTLV-I throughout time. In fact, we did not find anyone affected who was 34 years of age or older with a duration of IDU of <7 years. Moreover, the specific seroprevalence of HTLV-I infection according to years of injecting drug use demonstrated a significant linear trend with increasing duration, a result expected from a cross-sectional survey, which tends to demonstrate that the prevalence of infection increases with longer duration of IDU. Conversely, longitudinal studies have demonstrated that more recent exposure to injecting drug use represents a greater risk of viral infections when compared with longer duration of exposure (17,18). Duration of injecting drug use was associated with HTLV-I infection, especially among women; however, women also had a longer duration of drug use (median, 8 years) than men (median, 6 years), probably because women were also older (mean age, 27.4 years) than the men (mean age, 24.6 years) surveyed.

Our sample is probably a fair representation of low-income IDUs in Salvador. The historic district of the city has long been recognized as an important area for drug use and drug traffic by low income groups. However, these data are still derived from a volunteer sample and the generalizability to low-income IDUs elsewhere is unknown. The small sample size, especially for women, may have limited ability to ascertain differences in HTLV-I seroprevalence according to gender. Further seroincidental studies will be necessary to establish a temporal sequence between potential risk factors and onset of HTLV infection among IDUs in Salvador, Brazil.

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**Keywords:**

HTLV-I/II; HIV-1; Injecting drug use; Snowball sampling

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